

# REPORT: ORPHAN WELLS IN CALIFORNIA

An Initial Assessment of the State's Potential Liabilities to Plug and Decommission Orphan Oil and Gas Wells



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## SUMMARY

- Recent cases in California highlight the potentially expensive and complicated nature of plugging and decommissioning wells and the difficulty of determining liabilities following bankruptcy.
- As most of California's wells (98%) are located onshore, it will be important to assess the potential liabilities for onshore wells.
- An initial analysis of readily available information suggests that **5,540 wells** in California are, as defined, **likely orphan wells** or are **at high risk of becoming orphan wells** in the near future. The State's potential net liability (subtracting available bonds held by CalGEM) for these wells is estimated to be about **\$500 million**.
- The bond amounts available to pay for plugging and decommissioning vary according to operator, but in almost all cases these amounts are substantially lower than the predicted costs.
- The study provides recommendations for a more detailed analysis of orphan well liabilities using the findings from the initial report.

## BACKGROUND

There are about 107,000 active and idle oil and gas wells in California. At some point, each well will end its productive life and the operator of the well will be required to carefully plug the well with cement ('**plug and abandon**') and **decommission** the production facilities. There is a large population of nonproductive wells in the state, known as **idle wells**, which have not produced oil and gas for at least two years and have not been plugged and decommissioned. Idle wells can become **orphan wells** if they are deserted by insolvent operators. When this happens, there is the risk of shifting responsibility for decommissioning the wells to the State.

There are policies in place to protect the State from the potential liabilities of orphan and idle wells. For example, operators are required to file **indemnity bonds**—a form of financial assurance—when drilling, reworking, or acquiring a well, to support the cost of plugging a well should it be deserted. In an effort to prevent the orphaning of wells, the operators of idle wells are required to pay fees or develop management plans to eliminate **long-term idle wells**—wells that have been idle wells for 8 years or more. However, the available funds from these bonds and fees are

often not enough to fully cover the costs of plugging and abandoning the well and decommissioning its facilities. In some cases, especially for older orphan wells, there may be no bond at all.

The initial analysis performed in the full study uses broad categorizations (defined on next page) to screen for wells that may already be orphaned or that are at high risk of becoming orphan wells in the near future. The analysis finds that **5,540 wells** in California may already have no viable operator or be at high risk of becoming orphaned in the near future. The State's potential net liability (subtracting available bonds held by CalGEM) for these wells is estimated to be about **\$500 million**. The share of this long-run cost that will be borne by the State (as opposed to operators) will depend on policy, market outcomes, and other factors.

An additional **69,425** economically marginal and idle wells are identified in the study that could become orphan wells in the future as their production declines and/or as they are acquired by financially weaker operators. Increasing the financial security for these wells while they are still profitable may avoid plugging and decommissioning challenges in the future.

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## ABOUT THIS STUDY:

Concerned about the potential financial risks involved with idle and orphan wells and aware of similar problems in other parts of North America, the Division of Oil, Gas, and Geothermal Resources, now **California Geologic Energy Management Division** (CalGEM) requested the **California Council on Science and Technology** (CCST) produce a study assessing the State's potential orphan well liabilities. Using existing data from CalGEM, we have conducted a rough estimate of potential future costs to the State for plugging and decommissioning orphan wells. We have also summarized recent studies that compare the policies and practices of California to other states and regions.

CATEGORY	# OF WELLS	PLUGGING COST (M)	AVAILABLE BONDS (M)	POTENTIAL NET LIABILITY (M)
Likely Orphan Wells	2,565	\$308	\$10	\$298
Wells at High Risk of Becoming Orphan Wells	2,975	\$246	\$16	\$230
Other Idle and Marginal Wells	69,425	\$5,287	\$53	\$5,234
Higher-Producing Wells	31,722	\$3,385	\$27	\$3,358
<b>TOTAL</b>	<b>106,687</b>	<b>\$9,226</b>	<b>\$107</b>	<b>\$9,120</b>

The table above (Table 8 in full report) summarizes the State's potential liability for orphan oil and gas wells. "Plugging Cost" presents the total predicted plugging and abandonment cost for wells in each category, based on the district-specific average plugging costs discussed. "Available Bonds" sums up the total bond funds held by CalGEM (this number does not include bonds held by the State Lands Commission for some offshore leases, which are \$20 million or more in many cases). "Potential Net Liability" shows the difference, which is the State's potential liability for orphan wells. All dollar values are rounded to the nearest million dollars.

### SCREENING FOR ORPHAN WELLS

The first step in this analysis was to develop a rough screen for wells that may already have been orphaned or that risk becoming orphan wells in the near future.

In this study, wells with no production or injection in the past five years that also belong to operators with no California production or injection in the past five years are considered to be "likely orphan wells." The lack of observable activity is an indication that these wells may have no viable operator.

The next category of "wells at high risk of becoming orphan wells" are wells with no production or injection activity during the past five years that have an operator that is currently active in California but is small and operates primarily idle/marginal wells. This group includes idle wells where the operator's average production rate across all wells is less than five barrel of oil equivalents (BOE) per day, and the operator has fewer than 1,000 actively producing wells.

The third category of orphan well risk includes all "other idle and marginal wells," where we define marginal wells as wells producing fewer than five BOE per day. These wells are operated by major producers who face lower risk of insolvency than smaller producers. This category also contains currently active injection wells.

The fourth category includes wells that currently produce more than five BOE per day. These "higher-producing wells" are currently at low risk of becoming orphan wells.

### ESTIMATING PLUGGING COSTS

CalGEM provided costs for a subset of onshore wells that have been plugged at State expense since 2013, from which 86 wells were identified where expenditures were reported at the individual-well level. The average contract cost in this sample is \$68,000 per well. The range of costs is large (from \$1,200 to \$391,000). This is partially explained by district-specific factors (see Figure 5 in report). Given the limited data available, plugging costs for wells in each district were modeled using district-level averages, rather than a more in-depth analysis. For offshore wells, a placeholder cost of \$1.5 M per well was used based on recent costs—a rough approximation for this study.

Compared to California's wells overall, the 2,565 wells we identified as "likely orphan wells" are relatively concentrated near Los Angeles and Long Beach, where plugging costs are systematically high. In the unlikely event that 100% of the "other idle and marginal wells" were to become orphan wells, the additional net liability to the State would be about \$5 billion. Though unlikely, the number of wells in this category means that the State faces large possible costs, particularly in the event of a prolonged negative shock to the oil and gas industry.

The estimated total net cost to the State if it were to have to plug all active and idle California oil and gas wells would be about \$9 billion. This is interesting not only as an unlikely "worst-case" scenario but also as an estimate of the total plugging liability facing the California industry (regardless of whether it is borne by companies or by the State). See the full report for details. ■

## RECOMMENDATIONS

Using the data, results, and recommendations of the initial analysis, the study recommends that CalGEM perform a more detailed analysis of orphan well liabilities guided by the following recommendations:

### 1. REFINE PREDICTIONS OF WELLS AT RISK OF BECOMING ORPHANED.

A more detailed analysis could consider additional factors such as operator financial information, field-level production costs, and output price projections.

### 2. STUDY THE OWNERSHIP HISTORY OF ORPHAN WELLS AND WELLS AT HIGH RISK OF BECOMING ORPHAN WELLS.

Such research will identify the share of plugging and decommissioning costs that may be recoverable from previous operators. It will also increase understanding of well ownership dynamics, which are thought to involve wells moving to smaller, higher orphan risk operators as production rates decrease.

### 3. INVESTIGATE THE POTENTIAL ENVIRONMENTAL IMPACTS OF ORPHAN AND IDLE WELLS IN CALIFORNIA.

Possible impacts may include groundwater contamination, human health impacts, and other issues.

### 4. TRACK EXPENSES FOR ORPHAN WELL PLUGGING AND SURFACE RECLAMATION AT THE INDIVIDUAL WELL LEVEL IN A CENTRALIZED DATABASE.

This will allow for more detailed understanding of the determinants of plugging and decommissioning costs, and thus more accurate cost predictions for future orphan wells.

### 5. LEVERAGE THE NEW ANNUAL IDLE WELL FEE/IDLE WELL MANAGEMENT PLAN REQUIREMENT TO YIELD A MORE DETAILED COUNT OF WELLS WITHOUT VIABLE OPERATORS.

Failure to file the annual idle well fees or an idle well management plan can serve as legal evidence of desertion.

### 6. STUDY POTENTIAL CHANGES TO BLANKET BOND RULES THAT WOULD INCREASE THE EFFECTIVE PER-WELL BONDS FOR ECONOMICALLY MARGINAL WELLS.

CalGEM should consider whether securing larger effective per-well bonds while wells are still profitable would avoid enforcement challenges once wells become idle.

### 7. USE THE RESULTS OF A MORE DETAILED INVESTIGATION BEYOND THE LIMITED SCOPE OF THIS STUDY TO CONDUCT AN ECONOMIC ANALYSIS OF POLICY ALTERNATIVES.

CalGEM should identify specific policy changes with the greatest promise to manage costs from existing orphan wells and to efficiently regulate the number of additional orphan wells going forward.



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